Pelekunu Preserve
Moloka‘i, Hawai‘i

Long-Range Management Plan
Fiscal Years 2004–2009

Submitted to the
Department of Land & Natural Resources
Natural Area Partnership Program

Submitted by
The Nature Conservancy – Hawai‘i Operating Unit
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EXECUTIVE SUMMARY

The Nature Conservancy of Hawai‘i (TNCH) is the Hawai‘i Chapter of The Nature Conservancy (TNC), an international private, non-profit organization based in Arlington, Virginia. The Conservancy’s mission is to preserve plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. Since 1980, TNCH has helped protect more than 200,000 acres across the state. It has a statewide system of 12 preserves totaling 30,000 acres and has helped protect another 175,000 acres through cooperative projects with federal, state, county and private partners. On Moloka‘i, TNCH manages three “NAPP” (Natural Area Partnership Program) Preserves: Pelekunu, Mo‘omomi and Kamakou. The three NAPP preserves total just under 10,000 acres. TNCH also manages the ahupua’a of Kamalō & Kapualei through the East Moloka‘i Watershed Partnership (EMoWP). The Kamalō/Kapualei Watershed Project encompasses approximately 3,000 acres.

The State’s Natural Area Partnership Program is an innovative program that aids private landowners in the management of their native ecosystems. NAPP provides matching funds ($2 state to $1 private) for the management of qualified private lands that have been permanently dedicated to conservation.

Pelekunu was approved for NAPP funding in 1992, and soon thereafter TNCH implemented the management programs described in our initial plan, *Pelekunu Preserve FY1992 – FY1997 Long-Range Management Plan.* Previous management work was conducted under a Conservation District Use Permit (number SH-5/7/87-2028) and a temporary variance (number TV-89-6). In 1997, NAPP funding for a new 6-year period was reauthorized following a renewal procedure which included the preparation of an updated plan (*Pelekunu Preserve FY1998 - FY2003 Long-Range Management Plan)* and an environmental assessment *(Final Environmental Assessment for Pelekunu Preserve Natural Area Partnership, 1997*). Presently, TNCH is seeking reauthorization of NAPP funding for the next 6-year period for the programs described within this *Pelekunu Preserve FY2004 – FY2009 Long-Range Management Plan*. This plan continues the programs implemented under the previous plan and environmental assessment. Herein, we request **$882,705** in matched state funds for the 6 years spanning FY2004 – 2009.

Over the next six years our management efforts will focus on the following activities:

1. **Ungulate control** - Our primary management activity continues to be controlling feral goats (*Capra hircus*) and pigs (*Sus scrofa*) within the upper Pelekunu valley, and preventing the movement of these ungulates to the Oloku‘i plateau. Combining the strategies of State aerial hunting and working with volunteer hunters through the Moloka‘i Hunting Working Group we continue to strive toward the goal of reducing goat and pig activity levels to below 10%. We are aware of the increasing deer population and will continue to look for strategies that can effectively control them.

   Weed Control – Tracking the Hawai‘i Department of Agriculture's progress in identifying a successful biocontrol agent for the habitat-modifying weed *Clidemia hirta* and seeking TNC in-house approval to release it continues to be our main weed control issue at Pelekunu. To date, hindered by Conservancy policies and a lack of monitoring data for released biocontrol agents, we have done little to control the spread of *Clidemia* in Pelekunu’s upper valley. We don’t anticipate these issues to be resolved any time soon, however we will continue to stay in touch with the agencies testing biocontrol agents. We are prepared to make seeking in-

house approval for release a top priority as soon as a successful biocontrol agent is identified. We will also continue, and modify as needed, our present control strategies for selected weeds listed in "Table 1. Priority Pest Plants of Pelekunu Preserve."

2. **Natural Resource Monitoring and Research** – Our monitoring efforts over the next six years will focus on continuing the annual aquatic invertebrate, stream fauna and water quality monitoring which was initiated in FY2000. We will monitor other resources (native vegetation, birds and rare species) as needed, or as better, more streamlined methods are developed and approved statewide.

3. **Community Outreach** – Our community outreach efforts are focused on developing conservation awareness on Molokaʻi. Our outreach program takes a comprehensive approach and includes: producing and bulk mailing a quarterly newsletter; coordinating an island wide public/partnership event (Earth Day Celebration); an extensive volunteer program that involves a variety of people and organizations (AmeriCorps, *Hoʻikaika*, Molokaʻi Hunting Working Group, *Alu Like*); conducting monthly hikes; Public school classroom environmental education and field trips; Molokaʻi High School summer internships; and participating on a variety of committees and advisory groups.

4. **Watershed Partnership** - The East Molokaʻi Watershed Partnership (EMoWP) was formed in 1999 when a grass roots strategic planning effort produced an application for the USDA Empowerment Zone program. Stewardship of the islands' watersheds is one of the priorities of the application's strategic plan. The first project of the newly formed EMoWP is the Kamalō/Kapualei Watershed Project. A contour fence (at 3000'- 3500' elevation) was completed in April 2001 at Kamalō/Kapualei to prevent goats from damaging the upper native rainforest. The upper elevations of Kamalō and Kapualei are contiguous with the back rim (south) of Pelekunu Valley. Watershed partnerships are designed to leverage efforts between conservation partners. The fence is a great example of leveraging efforts between partners. As the active coordinator of this group, TNCH will continue to work with partners to promote stewardship activities in forest and watershed regions of Molokaʻi.

The State Department of Land and Natural Resources (DLNR), which administers the NAPP program, is kept apprised of our progress in the preserve through written reports and an annual inspection. Operational plans are submitted annually (the Conservancy has adopted a July 1 – June 30 fiscal year). These documents are also available upon request to others who are interested.

The first section of this plan is a brief overview of the native resources that are protected at Pelekunu Preserve. In the second section are management considerations that have shaped our programs. Finally, each management program is discussed in turn. Program goals are followed by an explanation of the management method we have chosen and a brief summary of each program's past accomplishments. Objectives and costs for each program from FY2004–2009 are also listed.

RESOURCES SUMMARY

General Setting

Pelekunu Preserve (Figure 1) was established in 1986 when the Conservancy purchased 5,759 acres in the northeast sector of Molokaʻi (most from Molokaʻi Ranch, Ltd.). The preserve was established to protect the free-flowing stream system, one of the best remaining in Hawaiʻi. Pelekunu Preserve is bordered by five other managed natural areas: state-owned Puʻu Aliʻi and Olokuʻi Natural Area Reserves (NARs), Kalaupapa National Historical Park, the Conservancy's Kamakou Preserve and the Kamalō/Kapualei Watershed Project. These managed areas belong to the East Molokaʻi Watershed Partnership (Figure 2) and protect more than 25,000 acres of contiguous ecosystems that range from sea level to 4,970 feet in elevation. The topography of Pelekunu Preserve is spectacular, with 3,000-foot valley walls dissected by a series of convoluted streams and ridges. This isolated area contains no roads and only a few rough trails.

Pelekunu Preserve encompasses the valley watershed of Pelekunu stream, its tributaries, and other smaller streams. At the coast, the preserve extends westward beyond Pelekunu Valley to include the smaller Waiohookalo Valley and its stream system. Annual rainfall ranges from 80 inches near the coast to more than 180 inches at the head of Pelekunu Valley. The valley's streams have never been diverted for export outside the watershed. As a result, this stream system is a prime example of an increasingly rare aquatic natural community (Hawaiian Continuous Perennial Stream) and contains a full complement of native aquatic fauna. Aquatic biologists consider Pelekunu's stream systems one of the top in the State of Hawaiʻi.

Because of its isolation, Pelekunu Valley has escaped modification from modern activities such as ranching, reforestation, agriculture, and tourism, all of which have transformed other parts of Molokaʻi. Historically, Hawaiians who terraced the land for crops and diverted the streams for irrigation inhabited the valley. Native-dominated vegetation occurs mainly in steep areas, especially at the coastal sea cliffs and surrounding valley walls. Many rare plants and diverse natural communities persist in these places.

The primary threats to Pelekunu's watershed and native species are the introduced ungulates: goats (*Capra hircus*), pigs (*Sus scrofa*), and axis deer (*Axis axis*). A secondary, related threat is invasion of non-native or "alien" plant species such as *Clidemia hirta* (see Weed Control Program section). Another potential threat to the preserve is the dewatering of the Pelekunu Stream system. However, the Molokaʻi Water Working Group, a community advisory group to the State Water Commission, has clearly stated that it does not want the undiverted north shore streams of Molokaʻi harvested in the near future. Other threats include: the over collecting of the delectable fresh water snail, hihiwai by human gatherers; invasion of the streams by non-native fish, insects and prawns; and cataclysmic events such as landslides.

Flora and Fauna

Pelekunu Preserve contains at least 14 native natural communities (Figure 3, Appendix 1). Of these, the Hawaiian Continuous Perennial Stream community is considered rare, as it is found in fewer than 20 sites worldwide. The other communities are more widespread aquatic and terrestrial communities, including a variety of coastal, lowland, and montane grassland, shrubland, and forest types. About half of the natural communities found in Pelekunu are also known from Puʻu Aliʻi and Olokuʻi NARs (Appendix 1).

Pelekunu Stream is one of the best remaining streams in Hawai‘i; therefore the State recognizes it as an “exemplary” Hawaiian Continuous Perennial Stream, characterized by the presence and abundance of the full array of native aquatic species. These species exhibit a stream to ocean life cycle referred to as diadromous. These diadromous species include five native fishes (collectively referred to as ‘o‘opu), a freshwater snail, hihiwai (*Neritina granosa*), and two native crustaceans, ‘opae kala‘ole (*Atyoida bisulcata*), and ‘opae ‘oeha‘a (*Macrobrachium grandimanus*) (Appendix 2). The native ‘o‘opu are some of the most unique organisms in the world. The pelvic fins of four of the five ‘o‘opu are fused and form a “suction” cup. The ‘o‘opu literally scale waterfalls by using their suction cup pelvic fin and thus they are able to utilize the entire stream. The one species that does not have this feature is the ‘o‘opu owao (*Eleotris sandwicensis*), and thus it is confined to the lower reaches of Hawaiian rivers.

Twenty-eight rare plant taxa have been reported from Pelekunu Preserve; eight of these are endemic to eastern Moloka‘i (Appendix 3). Ten of these taxa have also been reported from Pu‘u Ali‘i and/or Oloku‘i NARs. Of the 28 rare plant taxa reported from the preserve, 9 are federally listed endangered species and 1 is listed as threatened.

Five endemic forest birds have been reported from Pelekunu Preserve and adjacent areas. These include two federally listed endangered birds: the kakawahie (Moloka‘i creeper, *Paroreomyza flammea*), which is probably extinct, and the oloma‘o (Moloka‘i thrush, *Myadestes lanaiensis rutha*), which may also now be extinct. The Moloka‘i and O‘ahu populations of ‘i‘iwi (*Vestiaria coccinea*) are considered endangered by the state (Appendix 4). Two common endemic forest bird species are also found in Pelekunu Preserve, ‘apapane (*Himatione sanguinea*) and ‘amakihi (*Hemignathus virens wilsoni*). The indigenous ‘auku‘u, or black-crowned night heron (*Nycticorax nycticorax hoactli*), and the migratory ‘ulili, or wandering tattler (*Heteroscelus incanus*), have been reported along the main branch and tributaries of Pelekunu Stream. Koa‘e kea, or the white-tailed tropicbird (*Phaethon lepturus dorotheae*), an indigenous seabird, can often be seen along the sea cliffs in the back of the valley.

Finally, two endemic achatinellid land snail species, *Partulina mighelsiana* and *Partulina tessellata*, have been reported within or near the boundary of the preserve (Appendix 5). These rare snails are also known from Kamakou Preserve, Pu‘u Ali‘i and Oloku‘i NARs. In May 2001, aquatic ecologist of the Bishop Museum, Ronald Englund, observed two rare damselflies, *Megalagrion xanthomelas* and *M. pacificum* (which is now extinct on O‘ahu and Kaua‘i). He also observed one of the most rare aquatic insects in Hawai‘i, *Campsicnemus ridiculus*.

MANAGEMENT

Management Considerations

1. Pelekunu Preserve is extremely remote and the terrain is very rugged. There are no roads to the valley; access is only by boat, helicopter, or a long and hazardous foot trail. To accomplish management objectives, the Conservancy relies on helicopters for year-round access. Boats serve only the front of the valley, and only during the summer months, when seas are calm. Foot access is impractical due to the long (12-hour) hike over terrain and too rugged to carry necessary supplies.

2. A number of landowners retain a total of more than 350 acres in the valley. These people and other members of the Molokaʻi community exercise traditional access, gathering, and other rights within the valley, as recognized by law. Conservancy management does not alter these rights.

3. Pelekunu Preserve is part of The East Molokaʻi Watershed Partnership (figure 2). It is adjacent to the Kamalō/Kapualei project (their boundary is the mountain divide between north and south East Molokaʻi). These two projects of the partnership form the only known island profile managed for conservation of the natural resources from coast to coast. The Partnership helps to leverage effort over a larger landscape by combining resources and expertise. Our primary management activity to protect the preserve's native plants, animals, and natural communities is by protecting the watershed through the reduction of feral ungulate damage, limiting the spread of non-native, habitat-modifying plants, and preventing the introduction of other invasive species. The Conservancy's ungulate control priority in Pelekunu is to prevent ungulates from moving into Olokuʻi NAR from Kolo Ridge. Olokuʻi is thought to be the only place in Hawaiʻi that has never been damaged by feral ungulates. Management efforts over the landscape will benefit all conservation areas of the partnership. Animals and plants know no boundaries!

4. Because the majority of the lower valley is dominated by vegetation introduced by early Polynesians, Conservancy management focuses on the upper valley.

Management Areas/Units

The preserve is divided into three *management areas* (Figure 4): upper Pelekunu Valley, lower Pelekunu Valley, and the Waiohookalo Valley area. The upper Pelekunu Valley management area is further divided into four *management units*, as described below.

The Kīpapa and Pōhakuʻulaʻula Ridges separate Upper Pelekunu Valley from the lower valley area. The upper valley area is divided into four place name units: Pilipililau, Lanipuni, Kawainui, and Kapuhi. To date, the upper valley area (with the exception of Kapuhi unit and the upper reaches of Kawainui and Lanipuni units) is where we have focused most of our management. We will continue to concentrate on this area to maintain and improve the integrity of the upper watershed and to prevent ungulates from entering the adjacent Olokuʻi Natural Area Reserve.

Humans have substantially altered Lower Pelekunu Valley. Historically, the lower valley had the most inhabitants and was the most heavily cultivated part of Pelekunu Preserve. This is mainly due to this area's proximity to ocean resources and the fact that the wider valley floor is well suited for taro cultivation. Management in this area consists mainly of informal monitoring of the impacts of present-day humans. Ungulate populations in this area can get very high due to limited hunting. Therefore, we will involve community hunters as needed to prevent large-scale migration into the upper valley area.

Waiohookalo Valley, to the west, is separated from lower Pelekunu Valley by Manuahi Ridge. Almost no management occurs in this area. We are going to explore the logistics of going into Waiohookalo valley and determine future management activities.

Management Programs

Although the following management programs are described separately, they form an integrated management approach. For each program listed in the following section, we have indicated a major goal and described the management methods chosen. Also included are highlights of past and current achievements and key management issues. Finally, objectives and costs for FY2004–FY2009 are listed. Staff time and equipment expenses are shown separately in the "Personnel, Equipment, and Facilities" program section.

Program 1: Non-native Species Control

A. Ungulate Control

Program Goal

To hold ungulate activity[1] in the upper valley to less than 10% and prevent the movement of ungulates from the valley up to the Oloku'i plateau; to hold ungulate populations in the lower valley to levels that prevents negative impact on the upper valley.

Discussion of Methodology

Since we began our ungulate control program in 1991, various events have occurred that have shaped and guided our management decisions. A brief history of the ungulate control program is outlined below:

1991

- 1st Year of FY1992-1997 Pelekunu Preserve Long-Range Management Plan.
- Snaring began to reduce ungulate populations in Pelekunu upper valley.
- State aerial shooting program in progress along North Coast of Moloka'i, including Pelekunu.
- Monitoring transects established to measure ungulate activity.

1993

- Ungulate activity reduced to less than 10%.
- April -- all snares removed/aerial shooting suspended. The Moloka'i Hunting Test Working Group (MHTWG) formed to bring together government and private land managers,

[1] "Ungulate activity" is determined by monitoring belt transects for ungulate sign (e.g., tracks, scat, wallows, evidence of browsing). For example, if fresh sign is present in 10 out of 100 transect stations, the activity level is said to be 10%.

community members and hunters to identify, recommend and implement effective ungulate control methods. The group agreed to 'test' volunteer hunting as our primary method of ungulate control. This effort was called the Moloka'i Hunting Test.

- The MHTWG agreed to use already established monitoring methods and three criteria for gauging the effectiveness of its ungulate control efforts. MHTWG criteria for remote habitat areas would be met if: 1) overall transect average was below 10% activity for the year; 2) single monitoring session average activity was below 15% or; 3) single transect activity did not exceed 30% for two consecutive monitoring sessions.

1998

- Ungulate activity rose steadily since snares were removed in 1993. MHTWG, by consensus, voted to reinstate aerial shooting in the steep inaccessible areas. Aerial shooting and ground hunts reversed the upward activity trend, but activity still remained above the 10% level.
- Test was completed and assessed. All parties agreed to continue as the Moloka'i Hunting Working Group (MHWG).

1999

- Since the ground hunting began, several dogs were lost. This resulted in an established pack of wild dogs. The dogs were now threatening the one resident family in the Hā'upu Bay area. Resident Mike Donleavey was contracted to remove the dogs. It was decided by MHWG that all dog-assisted hunts would be suspended during the period of the contract. The wild dog contract was complete with one dog removed. Ground hunts resumed and wild dogs remained in the valley.
- Ungulate activity began a slight upward trend.

2000

- Wild dogs are still present. MHWG hunters and TNC staff have shot several to date. A strict protocol to prevent the loss of future dogs has been instituted to minimize the loss of dogs in the future.
- Aerial shooting suspended due to suspension of DLNR personnel and an effort to revise the State's Aerial Shooting Protocol.
- Ungulate Activity continues upward trend.

2002-Present

- Aerial shooting resumed in February. Several one-day ground hunts were added to increase ground hunting efforts.
- April monitoring shows reversal of ungulate activity upward trend. The present downward trend looks very promising.

Our ungulate control strategy for the next six years will be to continue the use of ground hunting combined with aerial hunting to bring ungulate activity down to 10% overall. Presently the activity level is at 21% and dropping. Ungulate monitoring results will be used (frequency may be decreased from quarterly to semiannually) to guide hunting frequency and strategies. We will work with the MHWG to explore new ungulate control methods and improve hunting strategies.

In addition to controlling ungulates on the preserve, we have become involved with the management of areas beyond our boundaries. The Nature Conservancy, the State Division of Forestry and Wildlife (DOFAW), and the National Park Service (NPS) are major land managers of Moloka'i's watershed areas. In FY2000 we formalized a partnership with the above

mentioned land managers and other neighboring land owners and conservation agencies to form the East Molokaʻi Watershed Partnership. The initial project of this partnership was the construction of a fence in the Kamalō/Kapualei ahupua`a and the reduction of the goat populations there.

The majority of our ungulate control budget is needed to cover helicopter transportation costs, maintenance of campsites, and field gear and supplies used by staff during scheduled hunts. We fly hunters and staff into the preserve several times per year; volunteer hunters supply their own food, firearms, and ammunition.

Activities

Years 1-3 (FY2004-06)

- Continue ungulate control program and develop new control methods as agreed to with the MHWG.
- Monitor existing nine upper valley threat monitoring transects (quarterly), and two lower valley transects (annually).
- Conduct annual trail clearing between camps for hunters.

Helicopter and supplies (annually)	$42,000

Years 4-6 (FY2007-09)

- Continue ungulate control program and develop new control methods as agreed to with the MHWG.
- Monitor existing nine upper valley threat monitoring transects (quarterly), and two lower valley transects (annually).
- Conduct annual trail clearing between camps for hunters.

Helicopter and supplies (annually)	$45,000

B. Weed Control

Program Goal
To prevent the spread of habitat-modifying weeds in the upper valley area of the preserve.

Discussion of Methodology
Habitat-modifying weeds are alien plants that have demonstrated the ability to suppress regeneration of, or displace, native vegetation. Many weeds become established when an area is disturbed by ungulates, which may also carry and spread seeds. In many areas, including Pelekunu Preserve, eliminating ungulates may be the most effective means of slowing the spread of habitat-modifying weeds.

In Pelekunu Valley, much of the valley floor was altered by human habitation and agriculture prior to the 1950s. The land was terraced for agriculture, and the streams were diverted to irrigate crops. Much of the vegetation in the lower valley was introduced by Polynesians and later by European settlers.

Our weed control program focuses on preventing the spread of habitat-modifying weeds in the upper valley, where native plant communities are still relatively intact and has four components: 1) developing and implementing a feasible, long-term control strategy for *Clidemia*; 2) identifying, mapping, setting management priorities and implementing control for other established habitat-modifying weeds; 3) preventing the establishment of new habitat-modifying weeds; and 4) Supporting Moloka‘i/Maui Invasive Species Committee (MoMISC) activities on Moloka‘i.

Clidemia hirta, a habitat-modifying weed that has extensively invaded other natural areas in Hawai‘i, remains our primary and immediate concern. *Clidemia* occurs throughout Pelekunu Preserve. Where native ecosystems are intact, *Clidemia* has a hard time invading. Manual and chemical control of *Clidemia* would be difficult to apply on a large scale in Pelekunu’s rugged terrain; moreover, these methods have not been effective in other natural areas in Hawai‘i due to the seed bank created on the ground once a plant has fruited. In May of 1990 (prior to writing the FY1992–1997 long-range plan), we began a biocontrol trial using the fungal agent *Colletotrichum gloeosporioides*. This work was done in cooperation with the state Division of Forestry and Wildlife and the University of Hawai‘i Cooperative Extension Service. To date, this agent has not been effective controlling *Clidemia* in Pelekunu. After releasing the fungal agent, we learned that TNC has a nationwide policy that prohibits introducing non-native species into Conservancy preserves without in-house approval. If reports become available documenting that the most recently studied biocontrol moths, *Mompha* and *Carposina* are successful and safe biocontrol agents, then we will seek approval from TNC Worldwide Office to release them.

Table 1. *Priority Pest Plants of Pelekunu Preserve.*

Scientific Name	Common Name
Ageratina adenophora	Maui pamakani
Andropogon virginicus	Broomsedge
Clidemia hirta	Koster’s curse
Fucraea foetida	Mauritius hemp, sisal
Lantana camara	Lantana
Melinis minutiflora	Molasses grass
Phyllostachys nigra	Black bamboo
Psidium cattleianum	Strawberry guava
Psidium guajava	Common guava
Schinus terebinthifolius	Christmas berry
Syzigium jambos	Rose apple
Spathodea campanulata	African tulip

Additional priority weeds (Table 1) will also be controlled with manual (pulling or cutting) and/or chemical methods. Herbicide use will be strictly limited, and in full compliance with the state Department of Agriculture’s pesticide branch. (Please note that at least one staff on Moloka‘i is certified by the state Department of Agriculture’s pesticide branch as a restricted herbicide applicator.) If herbicides are needed, staff will use Garlon 3A, Garlon 4, or Roundup, and always be in strict compliance with the label. Very small quantities will be used. Staff may employ additional herbicides as appropriate, under the direction of the state Department of Agriculture’s pesticide branch. Heavy equipment is not used for weed control in Pelekunu valley.

Examples of habitat-modifying weeds that have not yet made it to Pelekunu Preserve or to Moloka‘i are *Miconia calvescens*, *Passiflora mollissima* (banana poka), *Tibouchina* spp., and *Schefflera actinophylla* (octopus tree). As part of our community outreach program, during events like Earth Day and through our quarterly newsletter *Nature's Newsflash*, we educate the community about the threat these habitat-modifying weeds pose to Moloka‘i's natural areas. Also, as part of our prevention program, we enforce a protocol for alien species that includes cleaning gear and clothing prior to and after entering the preserve, and conducting annual inspections of helipads for new weeds. We also look for new weeds as part of our monitoring programs.

As part of the preserve winter ungulate surveys, presence/absence for all priority weed species (Table 1) are recorded along every threat monitoring transect. This information helps us track changes in the distribution of alien pest plants and alerts staff to new infestations. TNCH led the creation of the MoMISC partnership of government and private organizations in FY2001. MoMISC prevents the establishment of incipient pest populations through field activities and public education.

Activities

Years 1-6 (FY2004-09)

- Keep apprised of other agencies' *Clidemia* biocontrol monitoring efforts and if success is documented, seek TNC in-house approval to release.
- Survey upper valley areas for *Clidemia* and map upper elevation distribution. Assess feasibility of conducting manual and chemical control at the uppermost edge of the population.
- Identify, map and create a strategy for a 3rd habitat-modifying weed and implement control efforts.
- Conduct annual winter weed survey along all threat monitoring transects.
- Coordinate and support MoMISC activities to educate the public about preventing the introduction of new pest species.
- Control African tulip tree and conduct necessary follow up for six-year period.

Helicopter and supplies (annually)	$5,000

Program 2: Natural Resource Monitoring and Research

Program Goal
To track the biological and physical resources of the preserve and evaluate changes in these resources over time; to identify new threats to the preserve before they become established; and to promote research that helps guide management programs.

Discussion of Methodology
Resource monitoring tracks important biological and physical resources (especially native vegetation, birds, aquatic and terrestrial invertebrates, aquatic fauna, and rare species) over the long term. We have established four resource monitoring transects, with associated permanent plots, throughout the upper valley to track vegetation changes. Discussions are underway to revise and update the methods. Landscape-scale monitoring to track changes in the distribution

of natural communities will be conducted opportunistically when new aerial photos become available. Due to the steepness of the valley walls, it is not possible to establish transects in these areas. These areas are assessed from aerial photos (as they become available) and by scanning the cliff regions with binoculars from the valley floor. Because most of the rare plants in Pelekunu valley have already been mapped and are known to exist in steep areas requiring climbing equipment, rare plant monitoring is conducted by specialists on an "as needed basis".

Baseline data from the permanent vegetation plots in the upper valley were collected in 1993. In 1996 the vegetation plots were re-monitored. Rare plant monitoring was also completed in 1996. Analysis was not complete at the writing of this plan and current methodology will be revised for the upcoming monitoring. Vegetation monitoring (including rare plant and remote sensing monitoring) is currently being assessed. TNC is discussing the development of a system that is compatible with all Hawai'i conservation agencies and partners, so that an assessment of native vegetation can be done on a statewide level. The frequency and methodology will be determined during the six-year period.

Pelekunu's known rare plants (Appendix 3) have been mapped and most exist in steep, treacherous areas. TNC relies on climbing experts like those from the National Tropical Botanical Gardens (NTBG) to help survey and monitor the preserve's rare plants. NTBG has been actively collecting rare plant propagules since the early 1990's and provides an efficient means of obtaining information and making recommendations to TNC about the preserve's rare plants. We will continue to enhance rare plant habitat through our ungulate control programs and especially through aerial shooting on the steep cliffs of Pelekunu.

Monitoring the health of Pelekunu stream and its tributaries is imperative to maintaining the Hawaiian Continuous Perennial Stream, a rare aquatic community. A number of workers have surveyed stream fauna in Pelekunu Preserve. The Conservancy's first monitoring was conducted in 1986 by U.S. Fish and Wildlife Service personnel John Ford and Andy Yuen. In 1993 the Conservancy became involved with the Kalaupapa National Historical Park's Waikolu Stream study project, signing a cooperative agreement in 1994 to include a comparison with the Pelekunu Stream system.

In FY2000, TNCH staff began coordinating regular stream fauna and water quality monitoring in Pelekunu Preserve. The Stream monitoring is a cooperative effort between the State's Division of Aquatic Resources and Department of Health, Bishop Museum, and the Nature Conservancy. Stream monitoring includes annual surveys for diadromous macrofauna (native gobies and mollusks, and native and alien crustaceans) (Appendix 2). In FY2000, the Hawaii Biological Survey also initiated annual aquatic invertebrate monitoring. The information gathered from these studies of the streams' physical and biological characteristics will help develop strategies for protection and management. Stream monitoring confirmed that all four species of native goboid fish are still abundant in Pelekunu stream, including ʻoʻopu nakea (*Awaous guamensis*), ʻoʻopu nopili (*Sicyopterus stimpsoni*), ʻoʻopu alamoʻo (*Lentipes concolor*), and ʻoʻopu naniha (*Stenogobius hawaiiensis*), as well as the native mollusk, hihiwai (*Neritina granosa*), ʻoʻopu akupa (*Eleotris sandwicensis*) and aholehole (*Kuhlia sandvicensis*). Only one alien macrofauna species, the Tahitian prawn (*Macrobrachium lar*), is present in Pelekunu stream and appears to have only a minimal impact on native stream life. As part of the stream monitoring, since FY 2000, Bishop Museum's aquatic entomologist has surveyed terrestrial and aquatic invertebrates in and along the river corridors and riparian areas (Appendix 5).

Activities

Years 1-6 (FY2004-09)

- Complete annual aquatic monitoring session for Pelekunu Stream system and determine monitoring interval.
- Assist with aquatic invertebrate monitoring and logistics for lower and upper valley.
- Vegetation and Rare Plant monitoring to be determined.

Helicopter, travel, and supplies (annually)	$8,000

Program 3: Community Outreach

Program Goal
To build community support and awareness concerning the conservation of native natural resources, and to implement effective conservation practices that are also culturally sensitive.

Discussion of Methodology
The TNCH Molokaʻi community outreach programs go far beyond the boundaries of any single conservation site. We have taken a multi-faceted, comprehensive approach towards community outreach on Molokaʻi. TNC has evolved from being a site-specific conservation manager, to an organization that does conservation on a landscape scale. The population of Molokaʻi is approximately 7,000 and outreach activities help educate the community about the importance of preserving the natural resources of Molokaʻi, along with TNCH's role in managing those resources.

We work with a variety of conservation partners, schools, community groups, government and private funders, employment training organizations and programs, and individual volunteers and volunteer groups.

- Hoʻikaika (since 2001) and AmeriCorps (since1999) are year round Federal Programs that provide young adults as volunteers. In exchange, TNC provides conservation sites for practical, hands-on training.
- Internships (since 1984), summer workers from Alu Like (since 1987) and the State Summer Youth Employment Program (since 1993), also provide young adults to gain hands-on experience in natural resource conservation.
- Molokaʻi Advisory Council (since 1993), Molokaʻi Hunting Working Group (since1993), and Kamalō Conservation Advisors (since 2001) are community groups that we engage in program decision-making.
- Ke Aupuni Lokahi (Molokaʻi Enterprise Community "EC" Board) (since 1999), The Molokaʻi Water Working Group (MWWG) (since 1993), and Watershed Advisory Group (WAG) (since 2002), are examples of TNCH's involvement with Community-wide decision making entities. Ke Aupuni Lokahi oversees the EMoWP (which TNCH is a partner) as part of its broader goal to develop island wide community resources to stimulate the local economy yet retain its rural atmosphere. MWWG plays an advisory role to the State Water Commission's mandate of water allocation and projections. WAG is helping the State Department of Health assess and implement strategies to remedy non-point source pollution (water quality/sedimentation) on the south shore and reefs of Molokaʻi.

- We conduct monthly, guided hikes at Kamakou and Mo‘omomi Preserves (the Kamakou hike includes a scenic overlook into Pelekunu, and provides an opportunity for us to teach hike participants about Pelekunu’s important stream ecosystem), and work with the public schools to provide conservation/environmental education through field trips and slideshows. Moanalua Gardens Foundation is a key environmental education partner on Moloka‘i.
- Produce a quarterly newsletter, called “*Nature’s Newsflash*”, that is mailed to every address on Moloka‘i to inform the local community about conservation news and activities on Moloka‘i.
- On Moloka‘i our annual “big” event is the Moloka‘i Earth Day Celebration. Earth Day Celebration is a way of bringing together conservation agencies/organization to display their mission and accomplishments to the local community. The event is interactive and is geared to provide basic environmental education to the public. The event draws at least 10% of Moloka‘i’s population.
- Our volunteer program continues to grow and includes individuals, school groups (Moloka‘i Environmental Preservation Organization – MEPO a Moloka‘i High and Intermediate School club), trained hike docents, outer island weekend groups, and local Moloka‘i hunters and groups.

For the next six years, we will continue these programs as it is important to keep the Moloka‘i Community involved and informed about the island’s native natural resources and the effort needed to manage them. The development of new programs, or the deletion of any of the above will be determined on an annual basis. We do not promote the public use of Pelekunu Valley due to its remoteness and our inability to provide any emergency facilities, communication, or logistical assistance to the public users. We request that any public camping remain restricted to the beach.

Activities

Years 1-6 (FY2004-09)

- Maintain Ho`ikaika and AmeriCorps federal volunteer programs to provide support for field operations.
- Select and fund annual Moloka‘i High School summer intern (cost reflected in personnel).
- When feasible, train and oversee Alu Like and other Summer Youth Program participants in management activities throughout the summer months.
- Continue to engage community groups (MAC, MHWG, and Kamalō Conservation Advisors) in program decision-making; organize/recruit new groups as necessary.
- Continue to participate in MWWG, Ke Aupuni Lokahi, and WAG.
- Conduct monthly and special community group hikes at Kamakou and Mo‘omomi Preserves.
- Continue production and distribution of *Nature’s Newsflash*.
- Coordinate and organize annual Moloka‘i Earth Day Event.
- Maintain and develop docent and volunteer participation and conduct training sessions as needed.
- Cultivate active participation of Moloka‘i Earth Preservation Organization (MEPO) in the protection of Moloka‘i native natural resources (e.g. weed control trips, restoration of native ecosystems). Encourage MEPO to develop goals to become a source of native plants for re-vegetation.
- Conduct helicopter field trip for community group when warranted.

Helicopter and supplies (annually)	$3,100

Program 4: Watershed Partnership

The East Moloka‘i Watershed Partnership (EMoWP) was formed in 1999 when a grass roots strategic planning effort produced an application for the USDA Empowerment Zone program. Stewardship of the islands' watersheds is one of the priorities of the application’s strategic plan. The first project of the newly formed EMoWP is the Kamalō/Kapualei Watershed Project. A contour fence (at 3000’- 3500’ elevation) was completed in April 2001 at Kamalō/Kapualei to prevent goats from damaging the upper native rainforest. The upper elevations of Kamalō and Kapualei are contiguous with the back rim (south) of Pelekunu Valley. Watershed partnerships are designed to leverage efforts between conservation partners. The fence is a great example of leveraging efforts between partners. As the active coordinator of this group, TNCH will continue to work with partners to promote stewardship activities in forest and watershed regions of Moloka‘i.

Program 5: Personnel, Training, Equipment and Facilities

Program Goal
To maintain staff and facilities required to implement the goals of The Nature Conservancy on Moloka‘i in a safe, productive environment.

Discussion of Methodology
TNCH’s Moloka‘i operations maintain a full time base staff of 6, ranging from Director of Programs to Field Technician. The primary responsibility for these staff is implementing the management programs outlined in the three NAPP-funded Moloka‘i Preserve Plans: Kamakou, Mo‘omomi and Pelekunu. Other part-time, short-term, or year-to-year personnel are hired periodically as project needs warrant. Past funding for these types of hires has come from: Maui County Board of Water Supply and Office of Economic Development, NARS Fund for Watershed Partnership, USFWS, NRCS and various private contributors. MoMISC has hired a Field Technician on Moloka‘i to concentrate on incipient populations of invasive species located on the island. This person works out of the TNCH office and is supervised by TNCH’s Invasive Species Specialist. With the base staff and hiring of additional personnel as needed, we have been able to leverage our conservation efforts on Moloka‘i beyond the NAPP funded boundaries of the preserves.

All full time staff are provided training in first aid, CPR and fire suppression. Field staff participates in a variety of emergency and safety training programs offered by cooperating state and federal agencies (fire training, helicopter safety, hunter safety, rappelling, etc.). Other training needs, such as computer, communication and other skill building courses, are provided to staff on an individual, as needed basis.

Wildfire Management Plans for all three preserves are updated annually and reviewed with the lead state or county emergency response agency. Operational plans for all three preserves are updated annually and sent to neighboring landowners and agencies.

The Moloka‘i office/base-yard is located in the Moloka‘i Industrial Park. It is leased from Moloka‘i Ranch. In April 2007, rent will increase from the present rate of $3,125 to $3,828 monthly. In addition to the office/base-yard, facilities in Pelekunu Preserve include two cabins (USGS and Kawaiki) and two remote shelters (both at Papaiki, the shelters can be moved with a helicopter). Vehicles are not used at Pelekunu. Thirty percent of Moloka‘i base personnel, office/baseyard, travel and general operating costs are funded by the Pelekunu budget. All maintenance and insurance costs for facilities in the valley are paid from this budget. In addition, the cost of one helicopter trip for the purpose of conducting an annual NAPP inspection is included in this section of the budget.

The Nature Conservancy’s Honolulu office provides administrative, technical and annual planning support. In particular, the Coordinator of Landscape Conservation, the Ecologist, and other resource staff will help prepare annual plans and reports and develop and implement monitoring and research programs.

Activities

- Maintain base-yard facilities and equipment.
- Maintain preserve cabins, remote shelters and helipads.
- Update Annual Plan.
- Update Wildfire Management Plan.
- Maintain staffing needs.
- Update staff CPR, first aid, and fire suppression training.
- Provide staff skill building and safety training opportunities.

Salary, fringe, travel, facilities, equipment/supplies, and training (Year 1)	$131,300
Salary, fringe, travel, facilities, equipment/supplies, and training (Year 2)	$134,500
Salary, fringe, travel, facilities, equipment/supplies, and training (Year 3)	$137,828
Salary, fringe, travel, facilities, equipment/supplies, and training (Year 4)	$143,839
Salary, fringe, travel, facilities, equipment/supplies, and training (Year 5)	$147,439
Salary, fringe, travel, facilities, equipment/supplies, and training (Year 6)	$151,182

BUDGET SUMMARY

The following tables summarize the 6-year budget for Pelekunu Preserve. Through the NAP program, the State of Hawai'i will fund two-thirds of the costs outlined in this Long-Range Management Plan. Recognizing that the NAPP budget is not expected to increase significantly in the coming years, we have not included routine, annual increases for most of the program activities described above. In addition, little provision has been made for possible future inflation or general cost increases, other than a 4% annual increase for salaries and fringe benefits. If significant cost increases occur over the course of this Plan, we may need to work with DLNR to revise goals or seek additional NAPP funds through an amended plan.

An overhead charge is included to recognize the administrative support provided by TNC; although TNC's current negotiated rate with the federal government is 25%, a maximum of 10% is allowable by the State. Thus, TNCH will absorb the 15% in indirect differential, as well as any future increases to or other changes in the overhead rate.

	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	Total
Non-native Species Control:							
Ungulate Control	42,000	42,000	42,000	45,000	45,000	45,000	261,000
Weed Control	5,000	5,000	5,000	5,000	5,000	5,000	30,000
Resource Monitoring	8,000	8,000	8,000	8,000	8,000	8,000	48,000
Community Outreach	3,100	3,100	3,100	3,100	3,100	3,100	18,600
Personnel, Equip. & Facilities	131,300	134,500	137,828	143,839	147,439	151,182	846,088
Watershed Partnership	0	0	0	0	0	0	0
Subtotal	**189,400**	**192,600**	**195,928**	**204,939**	**208,539**	**212,282**	**1,203,688**
Overhead (10%)	18,940	19,260	19,593	20,494	20,854	21,228	120,369
TOTAL	**208,340**	**211,860**	**215,521**	**225,433**	**229,393**	**233,510**	**1,324,057**

	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	Total
Pelekunu Budget	208,340	211,860	215,521	225,433	229,393	233,510	1,324,057
Match (1/3)	69,447	70,620	71,840	75,144	76,464	77,837	441,352
NAPP Request (2/3)	**138,893**	**141,240**	**143,681**	**150,289**	**152,929**	**155,673**	**882,705**

ENVIRONMENTAL REVIEW COMPLIANCE

All actions being proposed for reauthorization in this Long-Range Management Plan are substantially similar to, and relevant to, the actions previously considered in the *Final Environmental Assessment of Pelekunu* for which we received a "Finding of No Significant Impact" in 1997. Pursuant to Hawaii Administrative Rule 11-200-13 (*Consideration of previous determination and accepted statements*), all environmental review obligations under the Hawaii Revised Statutes (Ch. 343) have been fulfilled and are in keeping with the letter and intent of the administrative rules regulating the Natural Area Partnership Program (HAR 13-210).

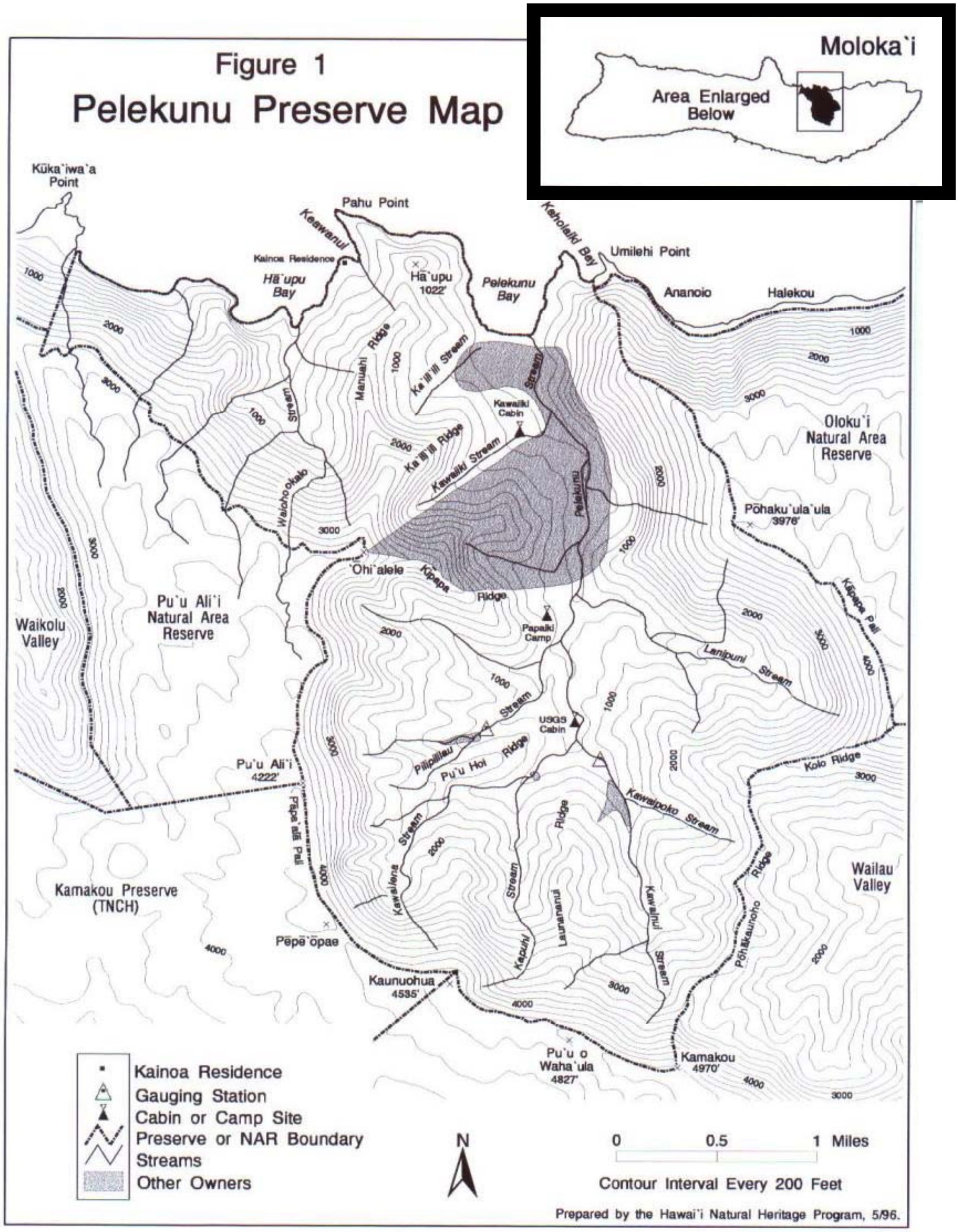
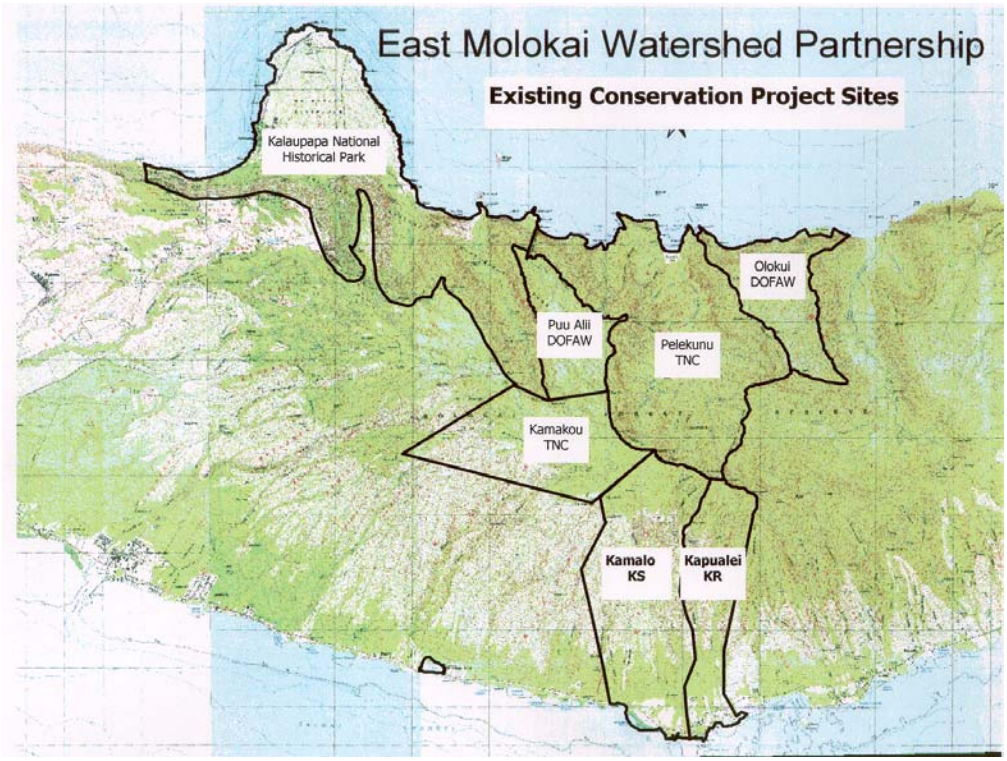


Figure 1
Pelekunu Preserve Map

Figure 2


East Molokai Watershed Partnership
Existing Conservation Project Sites
Kalaupapa National Historical Park
Olokui DOFAW
Puu Alii DOFAW
Pelekunu TNC
Kamakou TNC
Kamalo KS
Kapualei KR

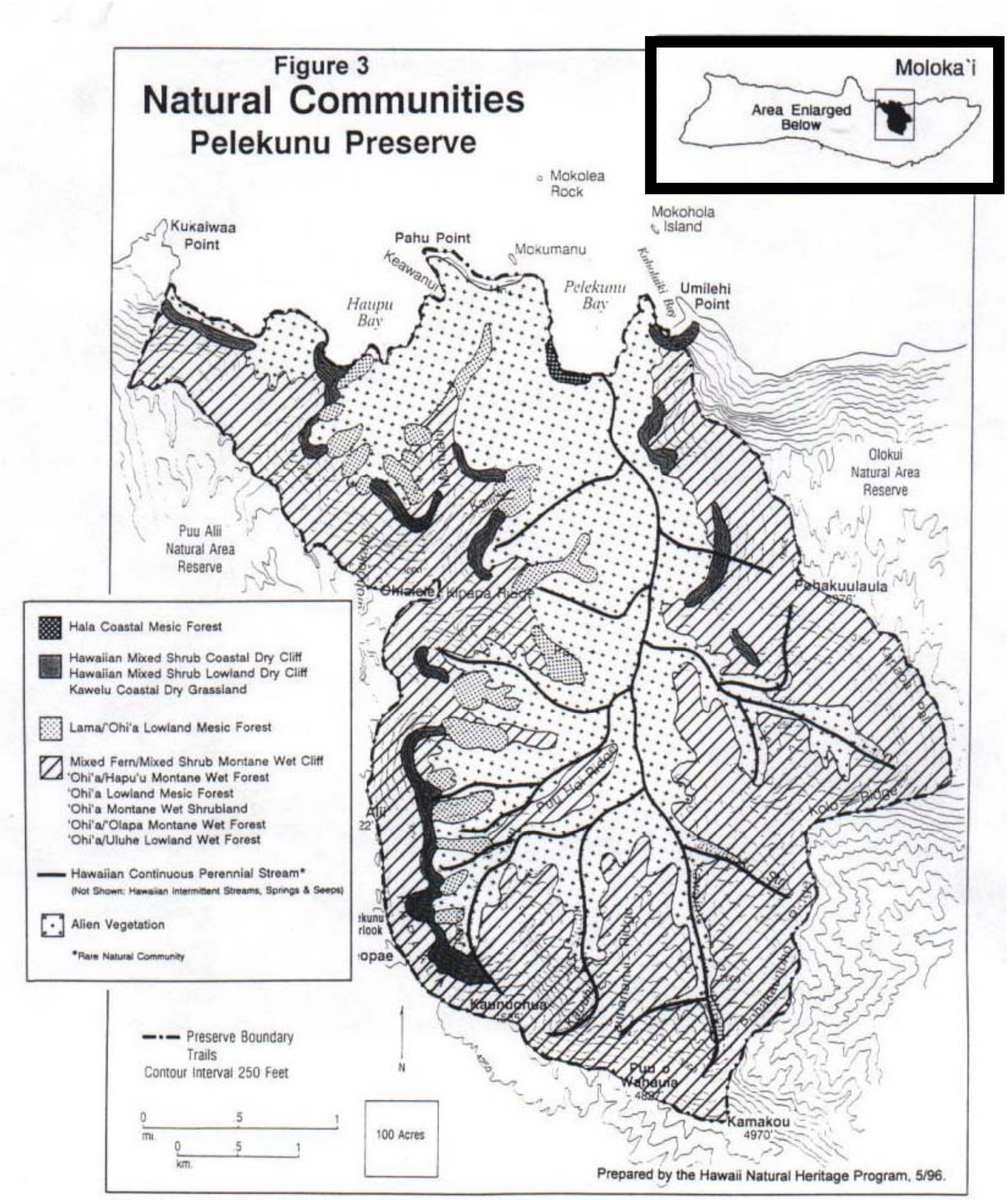


Figure 3
Natural Communities
Pelekunu Preserve
Moloka`i
Area Enlarged Below
Mokolea Rock
Mokohola Island
Kukaiwaa Point
Pahu Point
Mokumanu
Haupu Bay
Pelekunu Bay
Umilehi Point
Olokui Natural Area Reserve
Puu Alii Natural Area Reserve
Pakakuulaula
Kipapa Ridge
Puu Hai Ridge
Kolo Ridge
Kaunohua
Puu o Wahaula
Kamakou
4970'
Hala Coastal Mesic Forest
Hawaiian Mixed Shrub Coastal Dry Cliff
Hawaiian Mixed Shrub Lowland Dry Cliff
Kawelu Coastal Dry Grassland
Lama/'Ohi'a Lowland Mesic Forest
Mixed Fern/Mixed Shrub Montane Wet Cliff
'Ohi'a/Hapu'u Montane Wet Forest
'Ohi'a Lowland Mesic Forest
'Ohi'a Montane Wet Shrubland
'Ohi'a/'Olapa Montane Wet Forest
'Ohi'a/Uluhe Lowland Wet Forest
Hawaiian Continuous Perennial Stream*
(Not Shown: Hawaiian Intermittent Streams, Springs & Seeps)
Alien Vegetation
*Rare Natural Community
Preserve Boundary
Trails
Contour Interval 250 Feet
N
0 .5 1
mi.
0 .5 1
km.
100 Acres
Prepared by the Hawaii Natural Heritage Program, 5/96.

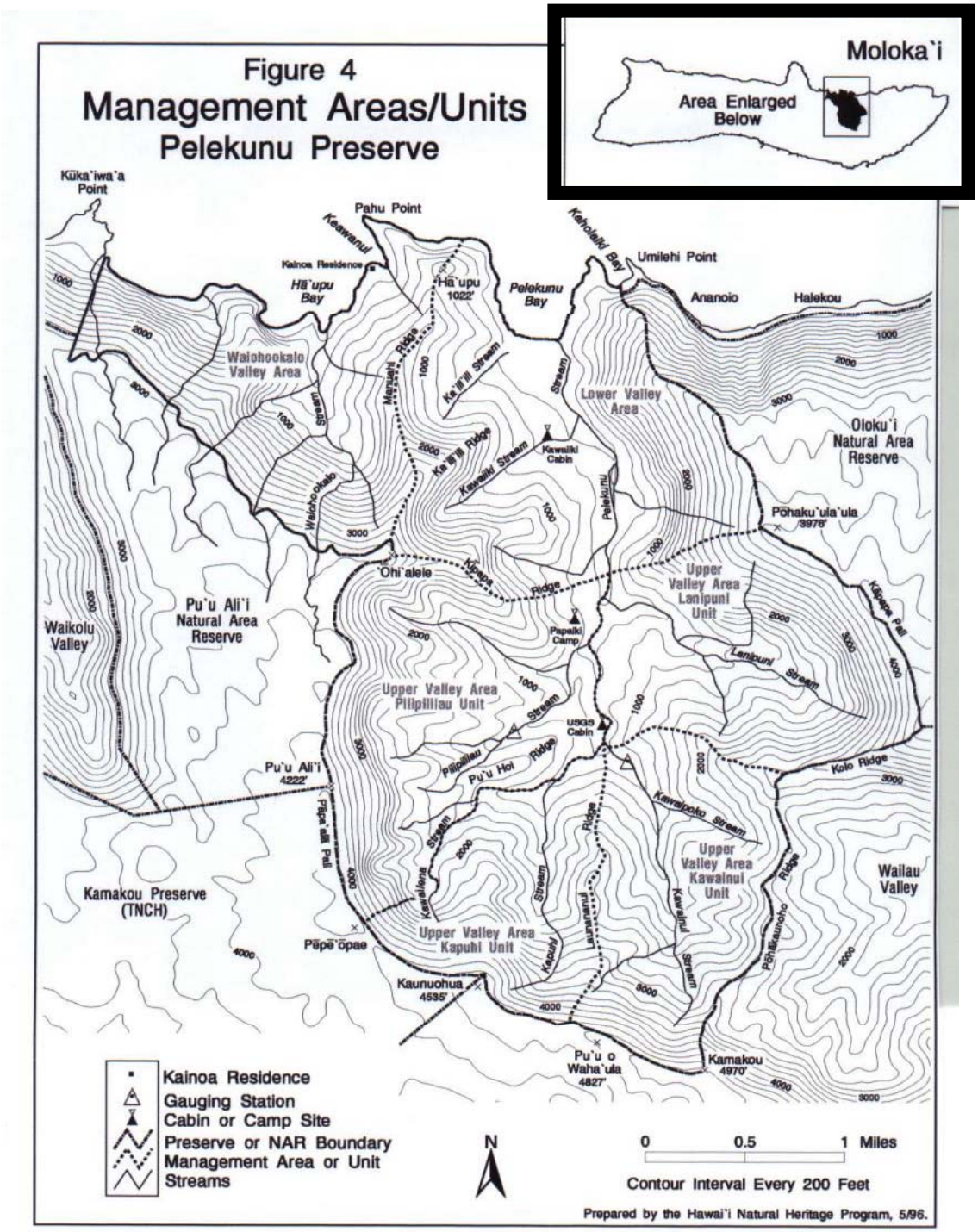


Figure 4
Management Areas/Units
Pelekunu Preserve
Moloka`i
Area Enlarged Below
Kūka`iwa`a Point
Pahu Point
Kainoa Residence
Hā`upu Bay
Hā`upu 1022'
Pelekunu Bay
Kaholelaki Bay
Umilehi Point
Ananoio
Halekou
Waiohookalo Valley Area
Lower Valley Area
Oloku`i Natural Area Reserve
Pōhaku`ula`ula 3976'
Kawaiiki Cabin
Kawaiiki Stream
Ke`e`ili Ridge
Manuahi Ridge
Waiohookalo Stream
Pelekunu Stream
`Ohi`alele Ridge
Upper Valley Area Lanipuni Unit
Papaiki Camp
Lanipuni Stream
Kōpapa Puli
Waikolu Valley
Pu`u Ali`i Natural Area Reserve
Upper Valley Area Piilipiliau Unit
USGS Cabin
Piilipiliau Stream
Pu`u Hoi Ridge
Pu`u Ali`i 4222'
Kolo Ridge
Kawaipoko Stream
Upper Valley Area Kawainui Unit
Wailau Valley
Kamakou Preserve (TNCH)
Pāpa`alili Puli
Kawailena Stream
Pēpē`ōpae
Upper Valley Area Kapuhi Unit
Kapuhi Stream
Kawaipui Stream
Pōhakaunoho Ridge
Kaunuohua 4535'
Pu`u o Waha`ula 4827'
Kamakou 4970'
Kainoa Residence
Gauging Station
Cabin or Camp Site
Preserve or NAR Boundary
Management Area or Unit
Streams
N
0 0.5 1 Miles
Contour Interval Every 200 Feet
Prepared by the Hawai`i Natural Heritage Program, 5/96.

APPENDIX 1
NATIVE NATURAL COMMUNITIES OF PELEKUNU PRESERVE

NATURAL COMMUNITY	GLOBAL RANK (a)
Coastal	
Hala (*Pandanus*) Coastal Mesic Forest	G3
Hawaiian Mixed Shrub Coastal Dry Cliff#	G3
Kawelu (*Eragrostis*) Coastal Dry Grassland	G3
Lowland	
Hawaiian Mixed Shrub Lowland Dry Cliff	G3
Lama/ʻOhiʻa Lowland (*Diospyros/Metrosideros*) Mesic Forest	G3
ʻOhiʻa (*Metrosideros*) Lowland Mesic Forest	G3
ʻOhiʻa/Uluhe (*Metrosideros/Dicranopteris*) Lowland Wet Forest	G3
Montane	
Mixed Fern/ Shrub Montane Wet Cliffs#	G3
ʻOhiʻa/Hapuʻu (*Metrosideros/Cibotium*) Montane Wet Forest#	G3
ʻOhiʻa (*Metrosideros*) Montane Wet Shrubland	G3
ʻOhiʻa/ʻOlapa (*Metrosideros/Cheirodendron*) Montane Wet Forest#	G3
Aquatic Communities	
Hawaiian Continuous Perennial Stream	G1
Hawaiian Intermittent Stream#	G4
Hawaiian Springs and Seep	G4

= Known also from adjacent NARs

(a) Key to Global Ranks as defined by the Hawaiʻi Natural Heritage Program, Aug 2001:

G1 = Critically imperiled globally. 1-5 occurrences and/or fewer than 1,000 individuals remaining; or more abundant but facing extremely serious threats range-wide.

G2 = Imperiled globally. 6-20 occurrences and/or 1,000-3,000 individuals remaining; or more abundant but facing serious threats range-wide.

G3 = Moderately imperiled globally. 21-100 occurrences and/or 3,000-10,000 individuals remaining; or more abundant but facing moderate threats range-wide; or restricted in range.

G4 = Widespread, abundant, and apparently secure, but with cause for long-term concern.

APPENDIX 2
CONSPICUOUS NATIVE AQUATIC ANIMALS (EXCLUDING INSECTS)
OBSERVED IN PELEKUNU STREAM AND ITS TRIBUTARIES

TAXON	SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK (a)	FEDERAL STATUS (b)
FISHES				
Eleotridae	*Eleotris sandwicensis*[1]	ʻoʻopu akupa, ʻoʻopu okuhe		
Gobiidae	*Awaous guamensis*[1]	ʻoʻopu nakea	G4	
	Lentipes concolor[1]	ʻoʻopu alamoʻo	G3	
	Sicyopterus stimpsoni[1]	ʻoʻopu nopili	G2?	
	Stenogobius hawaiiensis[2]	ʻoʻopu naniha		
Kuhliidae	*Kuhlia sandvicensis*[1]	aholehole		
Mugilidae	*Mugil cephalus*[2]	ʻamaʻama		
CRUSTACEANS				
Atyidae	*Atyoida bisulcata*[1]	ʻopae kalaʻole (shrimp)	G4?	
Palaemonidae	*Macrobrachium grandimanus*[2]	ʻopae ʻoheaʻa (prawn)	G3?	
MOLLUSKS				
Ancylidae	*Ferrissia sharpi*[1]	limpet		
Lymnaeidae	*Erinna aulacospira*[1]	pond snail		
	Pseudisidora rubella[1]	pond snail		
Melanidae	*Melanoides tuberculata*[2]			
Neritidae	*Neritina granosa*[1]	hihiwai, wi	G1G2	SOC
	Neritina vespertina[1]	hapawai		

[1] = Endemic
[2] = Indigenous
Source: Adapted from J. Ford and A. Yuen 1988. Natural History of Pelekunu Stream and its Tributaries. Island of Molokaʻi, Hawaiʻi. Part I, Summary Report.

(a) Key to Global Ranks as defined by the Hawaiʻi Natural Heritage Program, Aug 2001:
G1 = Critically imperiled globally. 1-5 occurrences and/or fewer than 1,000 individuals remaining; or more abundant but facing extremely serious threats range-wide.
G2 = Imperiled globally. 6-20 occurrences and/or 1,000-3,000 individuals remaining; or more abundant but facing serious threats range-wide.
G3 = Moderately imperiled globally. 21-100 occurrences and/or 3,000-10,000 individuals remaining; or more abundant but facing moderate threats range-wide; or restricted in range.
G4 = Widespread, abundant, and apparently secure, but with cause for long-term concern.
? = More information is needed to rank this taxon.

(b) Key to Federal Status:

SOC = Taxa that available information does meet the criteria for concern and the possibility to recommend as candidate.

APPENDIX 3
RARE NATIVE PLANTS OF PELEKUNU PRESERVE

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK (a)	FEDERAL STATUS (b)
Bidens molokaiensis	koʻokoʻolau, kokoʻolau	G1	SOC
Bidens wiebkei^	koʻokoʻolau, kokoʻolau	G1	LE
*Brighamia rockii**	alula, puaupaka, ʻolulu	G1	LE
Canavalia molokaiensis^	ʻawikiwiki, puakauhi	G1	LE
Clermontia oblongifolia ssp. *brevipes*	ʻoha, ʻoha wai	G3T1	LE
*Cyanea solanacea**	ʻoha, haha, ʻoha wai, popolo	G1	SOC
Cyanea solenocalyx#^	ʻoha, haha, ʻoha wai	G2	SOC
*Cyrtandra halawensis**^	haʻiwale, kanawao keʻokeʻo	G1	SOC
*Cyrtandra hematos**^	haʻiwale, kanawao keʻokeʻo	G1	SOC
Diellia erecta		G1	LE
Eurya sandwicensis#*	anini, wanini	G2	SOC
Gardenia remyi	nanu, naʻu	G1	C
Hedyotis elatior		G2	SOC
Hedyotis littoralis		G1	SOC
Joinvillea ascendens ssp. *ascendens**	ʻohe	G5T1	C
Lobelia hypoleuca	ʻopelu, liua, moʻowahie	G3	
Lysimachia maxima#^		G1	LE
Melicope hawaiensis	alani	G2	SOC
Peucedanum sandwicense	makou	G2	LT
Phyllostegia hispida^		G1	C*
Plantago princeps var. *laxiflora**	ale	G2T1	LE
Pritchardia lowreyana^	loulu	G1	
Schidea diffusa		G1	SOC
*Schiedea globosa**		G2	
Schidea pubescens var. *pubescens*		G2T1	C*
Stenogyne bifida#^		G1	LE
Tetramolopium sylvae		G1	SOC
Zanthoxylum hawaiiense	heaʻe, aʻe	G1	LE

Number of rare plants in Pelekunu Preserve: 28 taxa

Appendix 3 continued.

* = Known from Oloku‘i NAR
= Known from Pu‘u Ali‘i NAR
^ = Endemic to East Moloka‘i

(a) Key to Global Ranks as defined by the Hawai‘i Natural Heritage Program, Aug 2001:
G1 = Critically imperiled globally. 1-5 occurrences and/or fewer than 1,000 individuals remaining; or more abundant but facing extremely serious threats range-wide.
G2 = Imperiled globally. 6-20 occurrences and/or 1,000-3,000 individuals remaining; or more abundant but facing serious threats range-wide.
G3 = Moderately imperiled globally. 21-100 occurrences and/or 3,000-10,000 individuals remaining; or more abundant but facing moderate threats range-wide; or restricted in range.
G5 = Demonstrably widespread, abundant, and secure.

T1 = Subspecific taxa critically imperiled globally. 1-5 occurrences and/or fewer than 1,000 individuals remaining; or more abundant but facing extremely serious threats range-wide.

(b) Federal Status:
LE = Taxa formally listed as endangered.
LT = Taxa formally listed as threatened.
C = Candidate taxa for which substantial information on biological vulnerability and threat(s) support proposals to list them as endangered or threatened.
SOC = Species of Concern that available information does meet the criteria for concern and the possibility to recommend as candidate.

APPENDIX 4
RARE NATIVE BIRDS REPORTED FROM PELEKUNU PRESERVE

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK (a)	FEDERAL STATUS (b)
Moho bishopi	Bishop's ʻOʻo	GH	SOC
Myadestes lanaiensis rutha#	Olomaʻo, Molokaʻi thrush	GHTH	LE
Palmeria dolei	ʻAkohekohe, Crested honeycreeper	G2	LE
Psittirostra psittacea	ʻOʻu	G1	LE
Pterodroma phaeopygia sandwichensis	ʻUaʻu, Hawaiian dark-rumped petrel	G2T2	LE
Puffinus newelli	ʻAʻo, Newell shearwater	G2T2	LT
Paroreomyza flammea#	Kakawahie, Molokaʻi creeper	GH	LE
Vestiaria coccinea#	ʻIʻiwi	G4T1	E, -

#=Known also from adjacent NARs.

(a) Key to Global Ranks as defined by the Hawaiʻi Natural Heritage Program, Aug 2001:
G1 = Critically imperiled globally. 1-5 occurrences and/or fewer than 1,000 individuals remaining; or more abundant but facing extremely serious threats range-wide.
G2 = Imperiled globally. 6-20 occurrences and/or 1,000-3,000 individuals remaining; or more abundant but facing serious threats range-wide.
G4 = Widespread, abundant, and apparently secure, but with cause for long-term concern.
GH = Historical sightings, species possibly extinct.
T1 = Subspecific taxa critically imperiled globally. 1-5 occurrences and/or fewer than 1,000 individuals remaining; or more abundant but facing extremely serious threats range-wide.
T2 = Subspecific taxa imperiled globally. 6-20 occurrences and/or 1,000-3,000 individuals remaining; or more abundant but facing serious threats range-wide.
TH = Subspecific taxa historical. No recent observations, but there remains a chance of rediscovery.

(b) Federal Status:
LE = Taxa formally listed as endangered.
LT = Taxa formally listed as threatened.
SOC = Species of Concern that available information does meet the criteria for concern and the possibility to recommend as candidate.
E = Molokaʻi population considered endangered by the state only.
- = No federal status.

APPENDIX 5
RARE NATIVE INVERTEBRATES OF PELEKUNU PRESERVE

SCIENTIFIC NAME	COMMON NAME	GLOBAL RANK (a)	FEDERAL STATUS (b)
*Campsicnemus ridiculus**	Aquatic fly		
Megalagrion pacificum	Pacific Megalagrion damselfly	G2	C
Megalagrion xanthomelas	Orange-Black Megalagrion damselfly	G1G3	C
Partulina mighelsiana#	Achatinellid Land Snail	G1	SOC
Partulina tessellata#	Achatinellid Land Snail	G1	SOC

#=Known also from adjacent NARs.
*=Source: Hawai'i Biological Survey, July 2001.

(b) Key to Global Ranks as defined by the Hawai'i Natural Heritage Program, Aug 2001:
G1 = Critically imperiled globally. 1-5 occurrences and/or fewer than 1,000 individuals remaining; or more abundant but facing extremely serious threats range-wide.
G2 = Imperiled globally. 6-20 occurrences and/or 1,000-3,000 individuals remaining; or more abundant but facing serious threats range-wide.
G3 = Moderately imperiled globally. 21-100 occurrences and/or 3,000-10,000 individuals remaining; or more abundant but facing moderate threats range-wide; or restricted in range.

(b) Federal Status:
C = Candidate taxa for which substantial information on biological vulnerability and threat(s) support proposals to list them as endangered or threatened.
SOC = Species of Concern that available information does meet the criteria for concern and the possibility to recommend as candidate.

APPENDIX 6
DOCUMENTS RELATED TO PELEKUNU PRESERVE

Ford, J. and A. Yuen. 1988. *Natural History of Pelekunu Stream and Its Tributaries, Island of Moloka'i, Hawai'i*. Part 1, Summary Report. Unpublished.

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APPENDIX 7
RESEARCH CONDUCTED AT TNCH MOLOKA'I PRESERVES

On-going Projects

Origin and evolutionary diversification of the Hawaiian silversword alliance (Argyroxiphium, Dubautia, Wilkesia).

Dr. Bruce Baldwin, University of California, Berkeley. Bbaldwin@uclink4.berkeley.edu

Research began June 2002 and is in progress. Kamakou Preserve. Voucher specimen will be deposited at the University of California, Berkeley and Jepson Herbaria. Evidence from comparisons of nuclear rDNA and chloroplast DNA show that introgressive hybridization and even hybrid speciation have occurred on Kaua'i but the degree to which these phenomena have influenced evolution of the group on the younger islands remains uncertain. Comparing unlinked molecular markers between populations on different islands is a powerful method for detecting whether hybridization has had a lasting impact on the genetic composition of populations.

Evolutionary relationships and ecology of the endemic Hawaiian tephritid flies in the genus Trupanea.

Dr. Johnathan Brown, Grinnell College. brownj@grinnell.edu

Research began in May 2002 and is in progress. Kamakou Preserve. Collections will be deposited at Bishop Museum. The goals are to understand the evolution of host plant use, including any role that host switching has had on speciation, and the rate of evolution in behavioral and morphological characters that distinguish species of flies. The seed predators' hosts include endemic Hawaiian plants from at least 3 radiations: the silversword alliance (*Dubautia, Agyroxiphium*), *Bidens*, and *Artemisia.*

A study of Aquatic insects as indicators of stream health in Pelekunu Valley.

Dr. Ron Englund, Bishop Museum.

Research initiated May 24-25, 2000. Follow-up visit May 22-24, 2001. Pelekunu Preserve. Collections of aquatic insects as a part of Pelekunu stream monitoring effort in conjunction with TNCH and State Dept. of Aquatic Resources (DAR). Final deposition of collected specimen at Bishop Museum.

Taxonomic study and phylogenetic relationships among species of Hawaiian Dryopteris (Dryopteridaceae) ferns.

Jennifer Geiger, University of Colorado at Boulder, Ph.D. program.

Research began June 14, 2001. Kamakou Preserve. Collections will be deposited at NTBG and the University of Colorado herbarium (COLO). Morphological and molecular data will be used to delimit species of *Dryopteris*. This study will determine the actual number and distributions of *Dryopteris* species in Hawai'i.

Mark and recapture of Partulina redfieldi and Perdicella helena (tree snails) at Kamakou Preserve.

Dr. Mike Hadfield, Department of Zoology, University of Hawai'i.

Research began January 1984. Last visit Dec. 11-12, 2001. Tree snail populations of *P. redfieldi* on five trees are monitored, as well as old shells at the base of the trees.

Evolutionary biology, genetics, ecology, and behavior of Hawaiian Drosophilidae.
Dr. Ken Kaneshiro, University of Hawai'i. kykaneshi@hawai'i.edu

Research began 1963 and is in progress. During a March 1999 trip, *D. differens* was collected at a higher elevation than previously collected. Until now, this unique Moloka'i species had not been seen in over 15 years. Combined with other data from the Big Island, this significant finding indicates that some *Drosophila* species may be "moving" upland, perhaps in response to environmental changes.

Catalog of Hawaiian Drosophilidae and their host plants and study of the phylogenetic relationships among the major groups of the family Drosophilidae.
Dr. Patrick O'Grady, American Museum of Natural History

Research began in April 2002 and is in progress. Kamakou Preserve. The research goals are: (1) to catalog of the endemic Hawaiian *Drosophilidae* and their host plants, making specific notes on abundance, distribution, and ecological associations; (2) to infer the phylogenetic relationships among the major groups of the family *Drosophilidae*, especially the endemic Hawaiian species, using molecular character data and phylogenetic methodology.

Collection of propagules and/or status updates of rare plant species from Moloka'i: Genetic Safety Net program.
Steve Perlman, National Tropical Botanical Garden [Conservation Department].

Research began in Jan 23-25, 2001. Follow-up visit April 17-19, 2001. Rare plant field data and propagules collected for ex-situ propagation at the National Tropical Botanical Gardens on Kaua'i.

Ecosystem consequences of low-density feral pig populations in Hawaiian montane rainforests.
Drs. Peter Vitousek, Stanford University, and David Foote, National Biological Survey, Hawai'i Volcanoes National Park.

Research began in 1993 and is in progress. Kamakou Preserve. Objectives: 1) to determine the effects of low density pig populations on soil fertility, nutrient cycling, and nutrient loss over a five-year period in two Hawaiian rainforest sites that differ in soil fertility and substrate age; 2) to compare composition and cover/abundance of indicator invertebrate groups and understory plants in the same sites and time span, and to evaluate functional connections between invertebrate populations/activity and ecosystems processes; and 3) to assess the effectiveness of public hunting in accessible areas in protecting a reasonable level of ecosystem health in Hawaiian rainforest environments. Funded in part by TNCH's Ecosystem Research Program and the State of Hawai'i Natural Area Partnership Program.

Biological survey of endangered species throughout the Hawaiian archipelago.
Ken Wood, National Tropical Botanical Garden [Conservation Department] kenwood@ntbg.org

Research began in Dec. 1997. The main goal is to establish conservation collections of all endangered taxa in order to conserve their unique line of evolutionary divergence. Biological survey focuses on the collection of endangered species throughout the Hawaiian archipelago including the collection of seed, tissue, and genetic collections. This project is being funded by the Weathertop Foundation.

Final Reports

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